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ALBERTA PUBLIC WORKS, SUPPLY AND SERVICES
TERMS OF REFERENCE
FOR THE
PROPOSED PINE COULEE PROJECT
ENVIRONMENTAL IMPACT ASSESSMENT

ISSUED BY: Alberta Environment
October 29 1991

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Alberta
ENVIRONMENT
Environmental Protection Services
Environmental Assessment Division

6th Floor, Oxbridge Place, 9820 - 106 Street, Edmonton, Alberta, Canada T5K 2J6 403/427-6270 Fax 403/422-9714

25 October 1991

Our File: 60-PIN-9135

Mr. Dan Bader
Assistant Deputy Minister
Capital Development and
Reservoir Development Division
Alberta Public Works
Supply and Services
21st Floor, 8215 - 112 Street
EDMONTON, AB
T6G 5A9

Dear Mr. Bader:

RE: PROPOSED PINE COULEE PROJECT
ENVIRONMENTAL IMPACT ASSESSMENT
FINAL TERMS OF REFERENCE

Please find attached the Final Terms of Reference issued by Alberta Environment for the Environmental Impact Assessment (EIA) of the proposed Pine Coulee Project.

I look forward to receiving the completed EIA. Thank you for your cooperation.

Sincerely,

F Schulte

F.J. Schulte
Director

cc: G.J. DeSorcy, NRCB

LCC:wcr:1294EA

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ALBERTA PUBLIC WORKS, SUPPLY AND SERVICES
PROPOSED PINE COULEE PROJECT
ENVIRONMENTAL IMPACT ASSESSMENT
TERMS OF REFERENCE

1.0 INTRODUCTION

1.1 Nature and Scope of the Environmental Impact Assessment

The purpose of this document is to advise the government and the public of the information to be presented by Alberta Public Works, Supply and Services (APWSS) for an Environmental Impact Assessment (EIA) of the proposed Pine Coulee Project. The EIA is to identify and assess the significance of expected impacts from the operation of the Pine Coulee Project and to present mitigative measures and procedures to alleviate or minimize adverse effects. The EIA will enable the public and government to understand the environmental consequences of this project prior to a final decision on whether or not it may proceed. The proponent should make use of maps and tables to present information in the EIA.

The level of detail required for the EIA must be sufficient to gain a complete understanding of the environmental consequences of the project. In order to confirm the scope of the EIA and the level of detail necessary, the proponents should discuss their plans for the preparation of the EIA with the affected public and appropriate staff of the Alberta Government. The proponents are also encouraged to include whatever additional information, not already included in these requirements, which, in the proponent's opinion, will assist the government and the public in understanding the environmental consequences of this project.

1.2 Public Participation

The intent of public participation is to keep the public, who may be affected by the proposed project, informed of the proponents' intentions, and to provide them with the opportunities to express their concerns and contribute to the preparation of the EIA. Public participation is to include provision of opportunities to participate in the design, execution and review of investigations undertaken by the proponents to prepare the EIA.

The proponents must publish notice that they have been required to prepare an EIA, to advise of opportunity for the public to get information on the project, and to express any concerns they may have so that these may be addressed in the EIA. The EIA is to include a report that documents the public consultation initiatives that were undertaken, and which shows how the concerns and suggestions from the public were addressed.

1.3 The Proponent's Submission

The proponents are free to choose the order and format of the material presented in the EIA. The submission should, however, facilitate reference to the information requirements specified in this document, and the issues of concern expressed by the public.

2.0 PROJECT OVERVIEW

This section will contain information on the proponent and an overview of the development for which the EIA is prepared.

2.1 Proponent

The proponent for this project is Alberta Public Works, Supply and Services (APWSS).

2.2 Project Area

The project area is that area in which the project is expected to have measurable or otherwise significant physical, environmental or socio-economic impacts. The proponents should describe the project area for which it will identify and assess project impacts and provide the rationale for the selection of the project area boundaries.

For the purpose of this EIA, the project area for the proposed Pine Coulee Project is as shown in Figure 1 attached to the Project Description, appended to these Terms of Reference.

2.3 Physical Setting

The regional setting for the proposed development and the area that is to be the subject of the EIA will be described and illustrated. The geographic location, topography, physiography, hydrology, any unique geographical features, climate and infrastructure will be provided.

2.4 Site Description

Please provide maps and photo mosaics at appropriate scales, for areas where structures will be built or existing structures modified. For those areas where construction will occur, provide the location of buildings and facilities, domestic water wells, road access, utilities, irrigation works and other infrastructure. Please also map the ownership status of the subject lands including land owned by the Crown, local municipalities, and patented lands.

2.5 Development Plan

Please describe the various components of the proposed Pine Coulee Project. Include a discussion of how each component will be built, operated and maintained. Please also provide a schedule for the development of the proposed project.

2.6 Impact Summary

Please identify the key construction and operational activities of the proposed Pine Coulee Project that would have environmental implications and provide a summary of the impacts that may be expected.

The summary should outline the particular project component during the construction and operational phases of the project, its impact, significance and mitigation. The significance of the impact should be expressed in terms of their nature, extent and duration.

2.7 Legislation

Please identify the federal, provincial and municipal legislation for which regulatory approval will be required.

3.0 PROJECT NEED

A discussion of the need for this project should be included and fully documented. Include information on water demand and availability and the expected benefits to the environment, to municipalities, to the agricultural community, to recreationists and to the regional economy. Describe the objectives of the project and its rationale.

3.1 Alternatives

The various water supply/demand scenarios considered for the proposed Pine Coulee Project should be described. Where alternative means of achieving these objectives were considered, show what they were and why the proposed water management option was selected. Please identify alternative water management proposals originating from the public to achieve the objectives of this project, and discuss how they were considered. Please also discuss how water management needs and objectives in the Willow Creek basin were considered in the development of alternative water management configurations, and why they were rejected in relation to the preferred approach.

3.2 Project Definition

The proposed project is a multi-purpose water management project having operational and structural components.

Describe all the components including the operational component which is associated with diversions from, and return flows to, Willow Creek, and the structural component which is comprised of water supply and storage facilities.

3.3 Timing

The proposed timing of implementation of the project will be presented.

4.0 PINE COULEE PROJECT

4.1 Environmental Information

Alberta Public Works, Supply and Services (APWSS) must provide sufficient information to identify and assess impacts of the Pine Coulee Project on the Willow Creek Basin during its construction and operation. For each environmental parameter examined, describe the existing conditions, identify impacts and assess their significance, and discuss measures to be taken to alleviate or minimize adverse impacts. The information must be sufficient to provide the basis for predicting impacts, and the extent to which they can be mitigated by the proposed operating plan.

4.1.1 Flow Regime and Groundwater

4.1.1.1 Discuss the existing flow regime of Willow Creek. Describe the environmental consequences of the project on Willow Creek downstream from the reservoir.

4.1.1.2 Present predicted changes to flows within Willow Creek based upon diversions and reservoir releases. Assess changes to river bed aggradation and degradation and bank erosion that could occur as a result of changed flow regimes from project implementation.

4.1.1.3 Describe existing groundwater resources in the project area.

4.1.1.4 Identify predicted changes to existing surface and groundwater relationships within the basin as a result of diversions from Willow Creek and reservoir creation.

4.1.2 Water Quality

4.1.2.1 Describe existing water quality conditions in Willow Creek. Identify temporal and spatial trends. Identify factors affecting water quality, including season and discharge (nutrient loading from groundwater).

4.1.2.2 Present predicted changes to water quality within Willow Creek as a result of diversions out of Willow Creek and reservoir releases back to Willow Creek. Key water quality parameters will include dissolved organic carbon (DOC), suspended sediment and total phenols, temperature, dissolved oxygen, pH, phosphorus, nitrates, heavy metals and pesticides. Discuss predicted changes to water quality and resultant impacts upon municipal/domestic use, stockwatering, and other uses. Water quality guidelines should be included.

4.1.2.3 Predict the water quality in the proposed Pine Coulee Reservoir. Identify limitations of water quality upon recreational uses, fisheries, domestic municipal use, irrigation and stockwatering.

4.1.2.4 Address the impact of the proposed project on Willow Creek flows and water quality during the period of possible discharges from municipal lagoon systems.

4.1.3 Aquatic Plants

4.1.3.1 Describe the composition and distribution of all aquatic plant communities in Willow Creek. Any rare or endangered species will be highlighted.

4.1.3.2 Identify changes to these vegetative communities based upon diversions and reservoir releases.

4.1.4 Fish and Invertebrates

4.1.4.1 For all existing fish species, describe their composition, distribution, movement and abundance. Additional emphasis will be placed upon rare or endangered species. Describe the scope, timing, duration and location of fisheries studies.

4.1.4.2 Assess and map fish habitat with special emphasis on critical habitats such as spawning, rearing and overwintering habits. Identify instream flow needs for the fishery, and show how these have been incorporated into the development of the proposed Pine Coulee operations plan. Describe the methodology utilized.

4.1.4.3 Identify present limitations of physical habitat for fish populations.

4.1.4.4 Identify the impact of project construction and project operation on the fisheries resource with respect to nature, extent and duration. Positive and negative impacts resulting from construction of the diversion weir, changed flow regimes, water quality, food availability and aquatic vegetation will be emphasized. Include barriers to upstream movement by fish.

4.1.4.5 Undertake an assessment of the potential for fish populations to develop naturally, or to be successfully stocked in the Pine Coulee Reservoir. Include a proposed reservoir operation plan.

4.1.4.6 Describe the potential for mercury methylation in the newly created reservoir and its entering the aquatic food chain with emphasis on predictions of the level of mercury levels in fish that might be expected to inhabit the reservoir.

4.1.4.7 Describe the existing invertebrate populations of Willow Creek affected by project implementation.

4.1.4.8 Assess predicted changes to the invertebrate community based upon diversions and reservoir releases.

4.1.5 Terrestrial Vegetation

4.1.5.1 Describe the existing vegetative communities in areas to be permanently disturbed by project construction and reservoir filling. Rare and endangered species will be highlighted.

4.1.5.2 Describe the composition and distribution of riparian communities along Willow Creek affected by project implementation. Any rare or endangered species will be highlighted. Predicted changes to riparian communities based upon diversions and reservoir releases will be identified.

4.1.6 Soils

4.1.6.1 Describe the general nature and distribution of soils in areas to be permanently disturbed by project construction and reservoir filling.

4.1.6.2 Identify where identifiable, areas to be utilized for borrow materials and aggregate supplies including the size of the pit.

4.1.6.3 Identify reservoir areas that may be susceptible to slope instability and wind erosion during drawdown.

4.1.6.4 Assess geotechnical conditions that may result in seepage from the reservoir. Describe potential impacts as a result of reservoir seepage, particularly effects on groundwater.

4.1.6.5 Identify the amount of mercury in soils to be flooded by reservoir filling.

4.1.7 Wildlife

4.1.7.1 Describe the occurrences of mammals, birds, reptiles and amphibians within the project area. Rare and endangered species will be highlighted. Include a species list, seasonal distribution, movement patterns and relative abundance.

4.1.7.2 Delineate habitat availability and describe its quality and significance. Identify the key indicator species to be used to evaluate habitats.

4.1.7.3 Delineate and evaluate predicted effects on wildlife populations as a result of changes to habitat availability resulting from diversions from Willow Creek or permanent losses associated with reservoir flooding with respect to their regional significance.

4.1.7.4 Include any impacts on wildlife as a result of construction activities and any new infrastructure including roads.

4.1.8 Mitigation

4.1.8.1 Identify for all predicted significant negative impacts upon natural resources, appropriate measures to avoid, eliminate or reduce these impacts during project construction and operation.

4.1.8.2 Present and evaluate mitigative strategies to ameliorate or achieve an equitable balance with negative impacts.

4.1.8.3 Present a priority ranking of mitigative measures based upon significance of impacts, assessment of likelihood of success and cost-effectiveness. Non-mitigable impacts and their significance will be identified.

4.1.8.4 Identify further opportunities for environmental enhancement occurring as a result of project implementation and operation.

4.1.9 Monitoring

Present a monitoring program to evaluate the accuracy of predicted impacts, the effectiveness of mitigation measures implemented and the degree and duration of non-mitigable impacts. Identify scope, implementation schedules, costs and potential agency responsibility.

4.2 Historical and Archaeological Resources Information

An Historical Resources Impact Assessment (HRIA) of the project areas that will be physically disturbed or inundated by the project will be undertaken in accordance with the Historical Resources Act.

4.2.1 Provide a summary of the significant findings of the HRIA. Constraints on the proposed development in terms of protection and interpretation of the area's cultural resources should be identified.

4.2.2 Describe the mitigation program to offset the impacts of the proposed project in cooperation with Alberta Culture and Multiculturalism. A summary of the mitigation program should be presented.

4.3 Public Consultation

4.3.1 Present the process of public consultation, including the methods of how information was disseminated to the public, the type of information and the level and nature of response.

4.3.2 Discuss the establishment of public advisory committees identifying the representation, objectives and roles of each committee and the interrelationship between committees.

4.3.3 Present the process utilized to integrate public views in the scope and execution of the EIA as well as the public involvement in identification of mitigation strategies to alleviate or minimize adverse effects occurring as a result of project implementation.

5.0 SOCIO-ECONOMIC ASSESSMENT

This section of the EIA will assess the effects that the Pine Coulee Project could have on the population, infrastructure, recreational resources, land use and the economy of the project area. It will provide a benefit/cost analysis of the project and an assessment of the economic impacts on the region.

5.1 Construction and Operation

5.1.1 Identify the annual expenditures that could occur during project construction, operations and maintenance in terms of labour and non-labour (materials, equipment, etc.) components.

5.1.2 Provide the expected annual employment requirements, by skill level and number of employees, for project construction and operation. Provide this information on a quarterly basis for the construction period and annually for the operational stage of the project development.

5.1.3 Estimate the extent to which these employment requirements could be filled by residents of the study area. Identify the potential effect of project wages on the annual incomes of area residents employed on the project. Indicate any population changes anticipated for the area because of this project.

5.1.4 Discuss the extent to which material and equipment requirements could be purchased from businesses and suppliers in the study area and in the province.

5.1.5 Describe any programs or initiatives including training programs that could be undertaken to maximize benefits to residents of the study area.

5.1.6 Provide an estimate of the extent to which direct employment and labor income from project construction and operation could generate indirect and induced impacts elsewhere in the provincial economy.

5.1.7 Describe the effects (negative and positive) of an influx of temporary construction workers on the local community. Describe plans for the housing of construction staff.

5.1.8 Outline the environmental impacts associated with the construction phase including sewage resulting from construction camps.

5.1.9 Identify Alberta content of the project including Alberta Design, Engineering, Construction and Manufacturing Services.

5.2 Land Use and Infrastructure

5.2.1 Identify existing private land uses that would be directly affected by the Pine Coulee Project. Describe the nature of the land use, the area of land affected and the nature of the impact. Present opportunities for impact mitigation and compensation, including the cost of implementation.

5.2.2 Describe the procedure followed to achieve fair compensation to land owners for land required for the project and any associated damages or disturbances.

5.2.3 Identify all predicted impacts on public land uses, including transportation and other utilities. Describe the nature of the land use, the area of land affected and the nature of the impact. Present the opportunities for impact mitigation and compensation including the cost of implementation.

5.2.4 Identify all traffic patterns and volumes during construction and evaluate the ability of the existing road network to meet that demand. Identify the routes to be utilized during the construction phase.

5.2.5 Assess potential impacts of the project on mineral resource exploration and development opportunities, the ability of companies to access their existing mineral resource agreements, and the in-place mineral extraction and transportation infrastructure.

5.2.6 Identify the proponent's responsibilities as a result of any impact on the infrastructure. Describe plans to maintain the integrity of the existing road system, particularly Secondary Highways 520 and 527.

5.3 Recreation

5.3.1 Identify the nature, extent and location of water-based recreational activities in the study area, particularly Willow Creek Provincial Park.

5.3.2 Describe the characteristics of recreational resources before and after the implementation of the project and diversion plan. Provide an estimate of the nature and cost of the development of recreational infrastructure.

5.3.3 Describe the extent to which use of water-based recreational resources could change as a result of the project. Provide an estimate of the nature and amount of recreational activity that results. Analyze the future use of the Willow Creek Provincial Park and increased recreational activity available on the Pine Coulee Reservoir.

5.3.4 Outline the effects of the dam construction on Willow Creek Provincial Park, as well as the impacts to the local area after completion.

5.3.5 Identify and discuss the implications of the operation of the Pine Coulee project on the operation of the Chain Lakes Reservoir.

5.4 Agriculture

5.4.1 Identify the existing irrigated acreage in the Willow Creek Basin.

5.4.2 Identify the location of new lands that could be irrigated as a result of this project. Discuss potential changes in agricultural practices on these lands and on lands currently without a secure water supply. Discuss cropping patterns and expected yields.

5.4.3 Provide an estimate of the annual costs and benefits of switching from dry land to irrigated farming. Estimate the potential effect on farm income from higher crop yields and a more reliable water supply.

5.4.4 Provide an estimate of the extent to which anticipated farm incomes may generate indirect and induced economic impacts elsewhere in the regional economy.

5.5 Other Consumptive Water Uses

5.5.1 Describe existing water use activities in the Willow Creek Basin. Describe their source, volume and nature. Include the identification of any supply or quality problems for these uses.

5.5.2 Provide an estimate of future trends in water demand for the project area under the current operating regime. Project the extent of potential regional development resulting from this project.

5.5.3 Describe potential impacts of the proposed operating plan for the Willow Creek Basin on current and future water use, particularly in terms of improvements in reliability of supply.

5.6 Aesthetics

5.6.1 Discuss the impact of stream flow on aesthetics for locations on Willow Creek where the public commonly carries out recreational activities. Estimate the preferred and minimum flows necessary for this purpose.

5.6.2 Discuss the visual implications of the dam, roads and associated infrastructure. Show how and to what extent the proposal will be visible in the area.

5.7 Benefit/Cost Analysis

A benefit/cost analysis of the Pine Coulee Project should be provided. Summarize the benefits and costs of the overall project. This analysis must provide a comparison of conditions over a 50 year period with and without the Pine Coulee Project being in place. The benefit/cost analysis should present the effects of the project from a provincial perspective with regional considerations.

5.7.1 Provide a summary of all quantifiable benefits and costs of the project including the costs of construction and operation, increased value of agricultural production, recreational activities and sport fisheries, and improved reliability of water supply.

5.7.2 Provide the calculations for the net present value and benefit/cost ratio for the project and diversion plan. Present a sensitivity analysis of assumptions used to generate these values.

5.7.3 Identify all non-quantifiable benefits and costs expected during the life of the project. Discuss how these might affect the overall project benefit/cost analysis.

5.7.4 Present the distribution of the benefits and costs of the project and diversion plan among identified interest groups (such as taxpayers, farmers, recreationalists and governments).

29 October 1991
1105EA

ALBERTA PUBLIC WORKS, SUPPLY AND SERVICES

PROPOSED PINE COULEE PROJECT

PROJECT DESCRIPTION

ALBERTA PUBLIC WORKS, SUPPLY AND SERVICES

PROPOSED PINE COULEE PROJECT
PROJECT DESCRIPTION

1.0 PROJECT OVERVIEW

The proposed project is an offstream storage reservoir to provide flow augmentation in Willow Creek by storing water during periods of high flow and releasing it during periods of low natural flow to meet instream and consumptive demands.

1.1 Proponent

The proponent for this project is Alberta Public Works, Supply and Services (APWSS). The Pine Coulee Project is being developed by the Reservoir Development Division (APWSS) and will be turned over to Alberta Environment (AE) upon completion and operated by Development and Operations Division (AE).

1.2 Project Area

The project area for the proposed Pine Coulee Project is shown on the attached map (Figure 1). The Pine Coulee Project area includes Willow Creek from approximately 0.5 mi. (800 m) upstream of the SR527 bridge over Willow Creek near Willow Creek Provincial Park (proposed point of diversion) to its confluence with the Oldman River and approximately 8 mi. (13 km) of Pine Coulee upstream from the confluence of Pine Creek and Willow Creek (Pine Coulee dam and reservoir).

1.3 Physical Setting

The study area is located on the western edge of the Interior Plains physiographic region, near the Porcupine Hills. Surface water, aided by low infiltration rates, runs eastward from these hills towards the Willow Creek and Pine Coulee area. Local relief is subdued, with the exception of the north-trending Pine and Willow Creek valleys, which are incised some 80 - 115 ft. (25 - 35 m) into the uplands above the valleys. Both the Pine and Willow Creeks belong to the Oldman Drainage Basin. The climate is classified as semi-arid to subhumid continental. The mean annual precipitation is 16.5 in. (419 mm) and the annual potential evapotranspiration is approximately 30 in. (762 mm) near Claresholm. Hence, the potential evapotranspiration is approximately 1.8 times the precipitation.

1.4 Development Plan

The development consists of a diversion structure on Willow Creek, a supply canal from Willow Creek to Pine Coulee, and the Pine Coulee dam and reservoir with an outlet to Willow Creek.

Alberta NEWS RELEASE

ENVIRONMENT

Date: December 16, 1988

Subject: GOVERNMENT ANNOUNCES $62 MILLION WATER MANAGEMENT PROJECTS FOR SOUTHERN ALBERTA

Multi-use water storage reservoirs in the Little Bow and Willow Creek Basins will be constructed by the Alberta Government, Environment Minister Honourable Dr. Ian C. Reid announced today in Lethbridge.

The Willow Creek Basin Project, located 6 km. west of Stavely, will cost $35 million dollars over five years, and will provide an assured water supply for agriculture, municipal needs for Claresholm and Granum, and improved recreation opportunities.

The Little Bow Project will cost $27 million over four years. The project will preserve the Bow River fishery by protecting river flows in the Highwood River system, will improve the reliability of municipal water supplies for Vulcan, Champion, Cayley, Nanton and Carmangay, will create recreation potential at Clear Lake and the Little Bow River Reservoir, and will provide water for the agriculture industry. This project involves construction in three separate areas, including the Highwood River, in the town of High River; Clear Lake, 16 km. east of Stavely; and the Little Bow River, 16 km. east of Parkland.

Both projects should be concluded by 1995 with design and construction being managed by the Department of Public Works, Supply and Services under the Minister, Honourable Ernie Isley.

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Dr. Reid told a news conference today that these projects should not be viewed in isolation, "but as part of the ongoing management of water for the benefit of all southern Albertans."

"The recent years of drought have clearly demonstrated the need for careful water management and this has rarely been so obvious or so crucial in southern Alberta," the Minister said. "These projects will increase our ability to store spring water flows to help us better manage our water resources throughout each year far into the future."

Both projects have minimal environmental impacts which can be mitigated and have been the subject of environmental impact studies by the Department. They are supported by the Willow Creek Irrigators' Association, the Little Bow Water Users' Association and the Clear Lake Water Users' Group. To complete the process for both projects, Alberta Public Works, Supply and Services must submit a formal Environmental Impact Assessment to Alberta Environment.

"These projects will have demonstrable environmental and financial benefits to southern Albertans," said the Environment Minister. "The reservoirs are part of our water management strategy of effective use and conservation. They will mean reliable water supplies in the river basins for fish, will assist southern Albertans during times of drought, and the additional irrigated land will prevent dryland soil erosion," he said.

In addition to the construction costs of the reservoirs and diversion canals, there will be substantial investment undertaken by irrigators in order to apply water to the land.

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Equipment expenditures are expected to total $11 million for the Willow Creek Basin Project and $11.4 million for the Little Bow Project. In addition, expenditures related to expanded crop production will stimulate the local economy and net farm incomes are expected to increase by approximately $3.1 million per year for the Willow Creek Basin Project and $2.8 million per year for the Little Bow Project.

Recreation potential will increase through an expanded tree planting program, improved sport fishing, additional water sport activity, and development of day facilities. The Little Bow Project will begin next spring with construction of the Clear Lake segment to enhance recreation on the Lake. Reservoir construction will begin in 1990.

Project design is scheduled to begin next year on the Willow Creek Basin Project. Following the Environmental Impact Assessment land acquisition and environmental mitigation is expected to begin in 1990, with construction to commence in 1991.

Dr. Reid concluded by saying that these two projects will "bring substantial benefits to southern Alberta through the Government's continuing commitment to water management."

"With the new irrigation project on the Blood Reserve southwest of Lethbridge and the construction of the Oldman River Dam, our goal of ensuring that Alberta's most valuable resource is being used for the benefit of all Albertans is several steps nearer," he said.

- 30 -

For more information contact:

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Communications Branch
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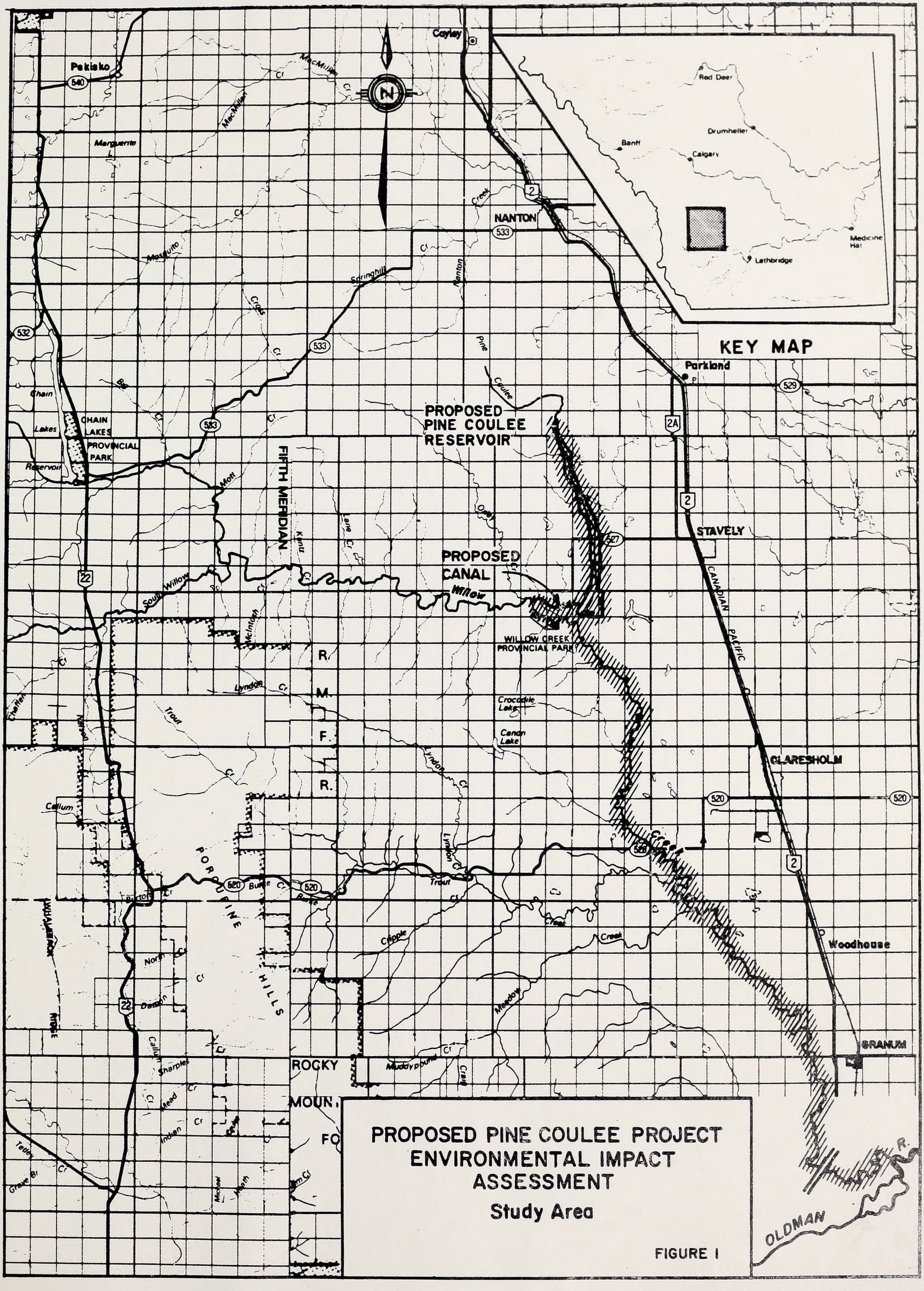

PROPOSED PINE COULEE PROJECT
ENVIRONMENTAL IMPACT
ASSESSMENT
Study Area

FIGURE 1

N.L.C. - B.N.C.
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